

**An Evaluation of the ‘Southern California Steelhead Recovery Plan’ (CIE
Peer Review Draft Version: May 27, 2009)**

by

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Table of Contents

1. Executive Summary.....	3
2. Introduction	5
Background	5
Terms of Reference	5
Description of Review Activities	5
3. Review of Information used in the Recovery Plan.....	6
4. Review of the Findings made in the Recovery Plan.....	11
5. Summary of Findings	17
6. Conclusions and Recommendations.....	19
7. Appendices	21
Appendix A: Bibliography of Materials Reviewed	22
Appendix B: Statement of Work for Dr. Larry Marshall.....	24
Appendix C: Editorial Comments	31

1. Executive Summary

The NMFS Recovery Plan for the ‘endangered’ Southern California Distinct Population Segment (DPS) of steelhead is expected to generate substantial interest from outside parties because it: (1) will contain recommendations involving water supplies for a variety of municipalities and agricultural users in an area of low annual rainfall; (2) will prioritize watersheds for targeted restoration actions; (3) could influence local and regional planning efforts and decisions involving land-development patterns; and (4) advise state agencies and local governments on actions necessary to further improve land-use and water-management practices to protect the listed species and its freshwater habitats and (5) subsequently have the potential for wide-ranging implications in the public and private sectors (Annex 1).

In order to ensure that recovery plans are based on the best scientific information and judgment and strengthen the quality and credibility of ESA recovery decisions, joint policy requires NMFS to solicit independent and impartial peer review on all recovery plans (NMFS 2007a). To this end, the Southwest Regional Office of NMFS solicited a review of the factuality of the contents, and scientific validity of the methodology and conclusions of the Draft “Southern California Steelhead Recovery Plan”. The Terms of Reference (Annex 1) focused on the evaluation of the adequacy, appropriateness and application of data, and recommendations made in the Plan.

The main conclusions and recommendations from the review are as follows:

- A. The Draft Report is well researched, written and free of major editorial glitches but to its disadvantage, deviates in the organization of the ‘Background’ from that recommended by NMFS (2007a). More significantly it excludes available and important background materials useful to the casual reader and those who will be affected by/ promulgating the Plan. Recovery time frame and cost estimates are apparently not yet developed. The available materials deemed necessary for inclusion are:
- a broader understanding of past and current abundances of steelhead in the DPS, i.e., likely to have been largely presented during the ‘listing’ process;
 - the critical habitat identified with respect to ‘listing’ and summary model outputs used to construct maps of predicted habitat in each DPS; and
 - the extent and location of site specific threats apparently identified in the CAP Workbooks and essential to the Implementation Plan.

Recommendations include: 1) append an organized form of the more detailed information to the Plan, and 2) include meaningful encapsulations in the Plan.

- B. Exclusions of a smaller scale which merit consideration/discussion in the Report include:
- a more insightful discussion of alternative criteria for viable populations;
 - text or graphics that better illustrate the ‘imminent’ risk of extinction;
 - scenarios of the more likely impact of climate change on steelhead in the DPS in question, including the potentially accompanying human adjustments to same;
 - the prioritization of equally rated recovery actions within and across basins;

- the potential in each BPGs over the next several decades for man's need for water to further compete with that remaining to steelhead;
- potential resources, particularly public resources, needed to attain near term (prevent extinction and lead to persistence) and long term (actions to down list/ de-list) objectives within each of Core watersheds; and
- more serious consideration of the use of living and live gene banks.

Because the Report is expected to have wide-ranging implications in the public and private sectors it seems imperative that as much background information as is available should be included/ appended to the document such that citizens can evaluate impacts in their 'back yard' and on their life style (e.g., water conservation). It would as well be instructive to the citizenry of the 5 BPGs to indicate the potential social and economic costs, years required and success in effecting targets of e.g., i) full recovery of core 1, and possibly core 2, and possibly core 3 populations, ii) only some conservation reliant populations and iii) only some populations in refugia under current and assessed 'best and worst' case scenarios of climate change. The latter analysis is unlikely to be acceptable in a recovery plan but might be invaluable during consultative processes.

2. Introduction

Background

The Endangered Species Act (ESA) requires NOAA’s National Marine Fisheries Service (NMFS) to develop and implement recovery plans for the conservation of threatened and endangered species. The endangered Southern California Distinct Population Segment (DPS) of steelhead occur in an area extending from the Santa Maria River south to the Tijuana River at the US-Mexico border. The geographic area of this DPS contains a series of large river basins that extend inland considerable distances and short coastal systems within urbanized areas that are densely populated. The draft recovery plan serves as a guideline for achieving recovery goals by describing the watersheds and recovery actions that must be taken to improve the status of the species and their habitats. Although the recovery plan itself is not a regulatory document, its primary purpose is to provide a conservation “road map” for Federal and state agencies, local governments, non-governmental entities, private businesses, and stakeholders.

The NMFS Recovery Plan for the southern California steelhead is expected to generate substantial interest from outside parties because it: (1) will contain recommendations involving water supplies for a variety of municipalities and agricultural users in an area of low annual rainfall; (2) will prioritize watersheds for targeted restoration actions; (3) could influence local and regional planning efforts and decisions involving land-development patterns; and (4) advise state agencies and local governments on actions necessary to further improve land-use and water-management practices to protect the listed species and its freshwater habitats. The draft recovery plan will include a large geographic area in southern California and has the potential for wide-ranging implications in the public and private sectors. Stakeholder interest will be high due to the potential impact to millions of southern Californians and is expected to lead to inquiries from elected representatives at the local, state and Federal levels.

Terms of Reference

Terms of reference (Annex 1) and Format and Contents of CIE Independent Reports (Annex 2) appear in Appendix B of this report.

Description of Review Activities

Review of the ‘Southern California Steelhead Recovery Plan’ (NMFS 2009) began in earnest following successful posting by M. Shivlani on the evening of May 30 (The DVD from NMFS arrived noon, June 1.). Prior to receipt of all materials, this reviewer searched the web for insights to the coming task and downloaded some of the work of Garza, Clemto and Girman as well as NMFS’s ‘2007 Federal Recovery Outline for the Distinct Population Segment of Southern California Coast Steelhead’. Upon receipt of NMFS materials, all were perused before focusing on the Draft Plan. The Draft Plan was then read with a view to the questions in Annex 1 in the ToRs.

First impressions of the potential thoroughness of all facets of a document are sometimes evident in the document’s editorial polish or lack thereof. Hence, at the same time that I made notes relevant to questions in the ToRs, I also noted some of the more obvious

editorial glitches and variation of the framework of the report (esp. the Background piece) from that prescribed by the NMFS “Interim Endangered and Threatened Species Recovery Planning Guidance Version 1.2” (NMFS 2007a). Notes on both matters are documented in Appendix 7c.

3. Review of Information used in the Recovery Plan

*Evaluate the adequacy, appropriateness and application of **data** used in the Plan.*

*3.1. In general, does the Plan include and cite the best scientific and commercial information available on the **species** and its **habitats**, including **threats** to the species and to its habitat including large-scale perturbations such as climate change and ocean conditions?*

3.1.1 Species: In general the Plan has its roots in the best available species information. I was however disappointed with the quantity of the species data brought forward to (included in) the Draft Plan from the TRT and other supporting documents.

Independent of the contents of the Recovery Plan, I was surprised at the paucity of data on steelhead within the southern California Steelhead DPS (Helmbrecht and Boughton 2005). There are no long-term time-series data. The apparent authoritative estimate of runs in the DPS (Busby et al. 1996) once ranged from 32,000-46,000 adults and is now less than 500. Interestingly, these estimates originate in a NOAA Technical Memo describing the status of west coast steelhead from Washington to California. The TRT provides no insight to: a) the California inputs which we are told originated from the Santa Ynez, Ventura, and Santa Clara rivers and Malibu Creek; b) the estimation procedures; or c) an overview of the relative population contributions of these inputs. More information, such as that which was presumably provided for the ESA listing and inclusion of information from Boughton et al (2006) would have been informative. The issue is relevant to the understanding of the DPS’ steelheads ‘imminent risk of extinction’ and the prescribed interim recovery target for small and large basins of 4,150 spawners.

Delineation of extinction risk/ viable populations/ recovery criteria are fundamental to a Recovery Plan and in the apparent absence of any significant monitoring/ assessment programs describing a) spawner abundance, b) magnitude and duration of ocean survival, and c) contribution of rainbow trout to anadromous runs etc., the TRT relied on a model-estimated viable population size based on very little data. One assumption in data input to the model was the similarities of the variance of random variation in environmental stochasticity between southern California steelhead and Central Valley (California) data for 19 populations of chinook salmon and one steelhead population (Boughton et al 2007, Appendix A). In the absence of any other geographically proximate data the argument for doing so was plausible, but the lone steelhead value was the second lowest of the 20 values and only about 40% of the mean value for chinook salmon. The resulting estimate of 4,150 spawners per year required to achieve a 95% chance of persistence for 100 years is proposed as an interim value ‘both necessary and adequate to safeguard a population’. Compared to other approaches/ data/ genetically estimated ‘effective population size’ that were mentioned in the various supporting documents but largely passed over in the Recovery Plan (see Question 2 following), this value is high and likely over ambitious and inappropriate for

small watersheds. The establishment of over ambitious targets for a species that is near extinction has the potential of stifling recovery initiatives in a region where competition for future water resources is likely to be lost by fish.

Relative to the dearth of data on steelhead abundance and population dynamics there was considerable genetic information available (Girman and Garza 2006; Garza and Clemento 2007, and Clemento et al 2008) but largely omitted from the 'Background' of the Recovery Plan. This was likely because the populations were already deemed a DPS (even though microsatellite data now suggest that the southern DPS and the south-central DPS are essentially one and the same) and because the focus of prioritizing recovery units had been reduced to the delineation of the five BPGs independent of genetics.

While the recent analyses of microsatellite data from anadromous and resident freshwater forms of southern and south-central populations points to a possible common ancestry, they also point to similarities between populations above and below impoundments; a low contribution of the Fillmore hatchery strain (except to the south of the Santa Clara River) to the reproduction of the native populations and a general pattern of low genetic diversity. Inclusion of synopses from the above cited supporting documents (and possible elaboration thereon) would be informative to the Plan and applicable for the consideration of recovery strategies additional to those described within the document, e.g., conserve and possibly increase genetic diversity of non anadromous rainbow trout by discontinuing stocking of Fillmore strain into potential refugia for steelhead traits above barriers.

3.1.2 Habitat: The Draft Plan is devoid of field measured freshwater habitat determinations for steelhead; rather it refers to potential habitat, derived from topographic, hydrologic and other features which were used in the delineation and categorization of core watersheds (Boughton et al 2007). It is unfortunate that the estimated areas were not brought forward by basin/sub-basin in summary format, e.g., a Table/ Figure for each DPS of estimated low flow (August) stream habitat area by gradient class. Such information with a generalized concept of preferred gradients (if not gradient * temperature) can inform a great deal about the relative potential of rivers to produce juvenile salmon.

The habitat requirements of steelhead are generally well documented from studies through the species Pacific coast range and to a very small extent, extant and accessible populations of the southern California DPS. Seven hundred and eight stream miles of designated critical habitat within occupied watersheds was documented in the Recovery Outline (NMFS 2007b). Neither that data nor characteristics of that habitat, e.g., area, gradient, stream order etc. were carried forward to the Draft Plan.

Delineation of potential habitat was necessitated by the need to determine those populations having the highest potential to meet viability criteria if they were to be completely restored (Boughton et al 2006). This necessitated parameterization of an Intrinsic Potential model using local inputs. Data consisted of stream gradient, valley-width index, low summer discharge, mean annual air temperature and limiting accessibility gradient. Data sources included GIS and proximate discharge and air temperature gauges. I cannot discern any issues with the parameters and modeling or with watershed characteristics summarized within each of the 5 BPG regions, particularly since the modeled outputs apparently largely

conformed to the expectations of the TRT. The data were not examined, but there is no reason to believe that they were not appropriate for the model.

3.1.3 Threats: Summaries of threats to the species are in general terms, well discussed in the Draft Plan. Their derivation and ranking through CAP Workbooks (used also on other salmonid populations) is outlined in Appendix D of the Draft Plan. Inputs are noted as having originated “from a broad range of published and un-published materials, including, peer-reviewed scientific publications, technical reports” etc., “management plans, barrier assessments, habitat evaluations, and field surveys, as well as information provided by NOAA-NMFS staff and stakeholders and other interested parties at a series of public meetings”.

CAP “Workbook summaries” per p 29 were not readily available for review and therefore not assessable for appropriateness or applicability. I did note that inputs from NOAA personnel could trump less informed inputs when data were available but did not notice mention of any weighting scheme for e.g., NOAA versus perhaps less informed stakeholders (this could as well be vice versa) and did sense that for at least some basins there was the potential to relate recognized threats to a ‘reach’ or stream order. Examples of such would have been useful in developing a detailed matrices or the Implementation Plan.

Extensive narratives have been included under the heading of ‘Environmental Variability’ on large-scale perturbations such as climate change and ocean conditions affecting steelhead. Specific considerations include ‘rainfall and runoff’, ‘groundwater’, ‘water temperature’ ‘wildland fire’ ‘sea level rise’ and as well a section on ‘California induced current ecosystems issues’. The narratives are sourced from current literature, generally refer to areas broader than southern California, and attempt to summarize the general effects on ecosystems important to steelhead. While data are not presented per se, the narratives are important to outlining the many uncertainties that could significantly impact recovery objectives and the ‘will’ of residents to be involved in such an uncertain undertaking.

With respect to the presentation of species, habitat and threats data/information which forms the basis of the Draft Plan, I recommend use of the NMFS (2007) “Background” framework (ref notes in Appendix C). It is definitely a more logical organization.

*3.2. Where available, are **opposing scientific studies or theories acknowledged and discussed?***

In general, I found the Draft Plan to be founded on sound science. Alternate approaches were well discussed in the TRTs but not always acknowledged within the Draft Plan.

3.2.1 Species: Potentially viable population sizes of less than the prescribed 4,150 spawners, particularly for small basins, might have been better acknowledged/ brought forward to the Draft Plan. Foremost would be mention of the concept of ‘effective genetic population size’ (N_e) and the determination that a N_e of 500 or 834 spawners per year; (Lindley et al. 2006 in Boughton et al. 2007), or even fewer if there was small amounts of migration between populations, may be adequate. Other examples of apparently persistent small basin steelhead populations include a 10-year average adult run-size of 922 (209-2730) in the Keough River,

BC (Ward and Slaney 1988) and a 6-year average rainbow trout run size of 868 adults in Stokely Creek tributary to eastern Lake Superior (Kwain, 1981).

3.2.2 Habitat: Habitat data from within the DPS was a significant limiting factor. The process of mapping potential habitat and analyses of same to rank relative recovery potentials of all steelhead originally present in the DPS is well documented and discussed in Boughton et al (2006). Unfortunately very little has been carried forward to the Draft Plan.

3.2.3 Threats: Traditional anthropogenic threats appear to have been largely developed and ranked through consultative processes, i.e., a consensus by majority? As mentioned earlier, the CAP Workbooks were not examined and only the consensus results were carried forward to the document.

Large scale perturbations such as climate change and ocean conditions were discussed in but not included as threat sources in the Draft plan’s BPG matrices. The discussion accommodated a cross section of different hypotheses all of which contributed to the uncertainty of conditions impacting steelhead in the coming decades. No synthesis of most probable events was attempted.

3.3 Are the scientific conclusions sound and derived logically from the results?

In general the Draft Plan is based on the best available data, appropriate analyses, and results and conclusions which have been subjected to the peer review of the TRT. Science based results/ conclusion might be classified into two categories: 1) those that address the immediate objectives of preventing extinction, significant decline or beginning recovery, and 2) because the Draft Plan is extremely data-poor, those that will clarify key aspects of population structure, support planning for climate change and identify ecological factors that promote anadromy.

The principal science-based results that contributed to the development of the Draft Plan were:

- 1) elucidation of population structure, including issues of introgression and/ or hybridization of planted hatchery trout with native trout, and genetic diversity within basins;
- 2) viability criteria for steelhead inhabiting the southern California DPS;
- 3) the potential habitat based on juvenile occurrence, bioclimatic envelopes, stream gradient and valley width indexes, and prioritization of rivers/ populations for recovery; and
- 4) identification and prioritization of threats to the steelheads existence.

Results within the above categories were addressed with only a few concerns in items 3.1 and 3.2 (this report) and assessed as being conclusive enough for the development of the Draft Plan.

In completing the above tasks, the TRT as well concluded that a number of quantitative investigations were necessary to support or replace assumptions in data poor conclusions, particularly involving viability criteria. Core activities included the estimation of annual run

sizes, year-to-year variability and response to recovery actions...all essential to adaptive management. More specifically the Recovery Team has concluded that there is a need to:

- determine the relationship between flow patterns, abundance and timing of smolt and adult runs;
- identify steelhead nursery habitats;
- determine the extent to which seasonal lagoons are used as nursery areas for juvenile steelhead, and ecological factors that contribute to lagoon productivity and reliability;
- research potential nursery role of mainstem habitat;
- test the importance of intermittent creeks in contributing to steelhead viability targets
- determine saturation density of spawners in both mainstem and tributary spawning habitats;
- identify environmental factors that specifically promote anadromy;
- determine if there is any regularity in freshwater and anadromous life-history crossovers;
- determine how life-history crossover affects the persistence of the anadromous form;
- determine the frequency of inter-basin exchange and impact on population structure; and
- identify watersheds that are resistant to the negative effects of drought on steelhead habitat.

The TRT is also supportive of the four working groups currently assessing and ranking the responses of salmon and steelhead populations to climate change on a coastwide basis. The TRT has also concluded that there will be utility in these working groups determining:

- how climate trends will alter the wildfire regime (affecting sedimentology and hydrological processes);
- if different basins will develop distinctly different wildfire regimes (affecting habitat dynamics, carrying capacity, and viability);
- what environmental factors maintain suitable summer stream temperatures;
- if there are natural freshwater refugia that sustain *O. mykiss* during droughts longer than their generation time;
- how patterns of intermittency are likely to respond to climate change, and
- the implications for steelhead population viability under potentially more episodic flood and drought regimes under future climate change.

Based on the TRTs assessment of the current state of knowledge about the regions steelhead populations and need to validate the derived population-level viability criteria with performance-based criteria' for verification and refinement of the Plan's targets and objectives, I believe that the conclusions regarding necessary research are valid.

4. Review of the Findings made in the Recovery Plan

Evaluate the recommendations made in the Plan.

4.1. Does the Plan meet the minimum standards for recovery plans outlined in the NMFS Interim Recovery Guidance and mandates described in section 4(f)(1)(b) of ESA to include site-specific management actions, objective measurable criteria (criteria that links to listing factors) and estimates of time and cost?

The Draft Plan does not yet meet all of the minimum requirements of section 4(f)(1)(b) of ESA, i.e., “each plan must include, *to the maximum extent practicable*,

- a description of such *site specific management actions* as may be necessary to achieve the plan’s goal for the conservation and survival of the species;
- *objective, measurable criteria* which, when met, would result in a determination...that the species be removed from the list; and
- *estimates of the time required and the cost* to carry out those measures needed to achieve the plan’s goal and to achieve intermediate steps toward that goal.”

4.1.1 ‘*Site-specific management actions*’ in the Draft Plan are addressed in Sections 6, 7 and 8-12 at the sub-basin level (for larger basins) or watershed level (smaller basins). Critical actions are aimed at named dams and water diversions which obstruct fish passage or alter natural stream discharge but these are few relative to the more general recovery actions. The majority of actions are less specific e.g., ‘develop a plan and implement a program’, ‘conduct a watershed wide assessment’, ‘review permits etc. and have yet to be fleshed out.

4.1.2 The framework for ‘*objective measurable recovery criteria*’ is delineated in Table 5-1 of the Draft Plan. The criteria selected by the TRT, are ‘mean annual run size’ ‘ocean conditions’ ‘spawner density’ and ‘anadromous fraction’. A target of 4,150 spawners/ river (viewed by this reviewer as overly precautionary for most rivers) has been set for mean annual run size. The required anadromous fraction is currently assumed to be 100% and the run size criterion during poor ocean conditions is to be based on 6 decades of information. The threshold for spawner density criterion is as yet unknown. In summary, all objectives are *measurable*, or fixed. The ‘catch’ is that there is currently no long term monitoring in the DPS with which to estimate the status of populations.

4.1.3 The ‘*time required and the cost*’ estimates are not as yet included in the Plan. The intention to do so is obviated by the empty cells in the ‘action matrices’ for each of the sub-watersheds within each of the 5 BPGs. Confidence that this was in fact happening might have been instilled by mention of the ‘cost references’ document of Thompson and Pinkerton (2008). It is presumed that costs will be inserted in the tables following the identification and insertion of “responsible parties” in the same tables. The completed tables could then be used to craft the narrative of an Implementation Plan that incorporates elements which NMFS alone acknowledges in Section 15 of the Draft Plan.

It is evident that recovery of the southern California steelhead will not make any great headway in the context of the 5-year cost estimates sought for inclusion in the tables. Hence, in light of the potential adverse impacts of climate change and the increasing human

competition for water over the coming decades, it may be prudent to also include in the Recovery Plan, some discussion of potential resources, particularly public resources, needed to attain near term (prevent extinction and lead to persistence) and long term (actions to down list/ de-list) objectives within each of Core watersheds.

4.2. Is there a clear presentation of the species' extinction risk, the threats facing the species and the necessary actions to remove or reduce those threats such that recovery goals can be achieved?

The Draft Plan presents separately: only a brief insight to *extinction risk*; generous insight to the *key threats*, and a considerable listing of *recovery actions*. To this reviewer, 'extinction risk', was short changed while at least one significant threat and a few recovery actions have been overlooked or dismissed.

4.2.1 Steelhead of the DPS are described as being in imminent *risk of extinction*. The only obvious information supportive of this risk seems to be founded in the current estimate of 500 returning steelhead relative to the past estimates of 32,000 to 46,000 (< 2% of past estimates). Past and present distribution data and past and present habitat data are not included for amplification. A summary 'Figure' of the distribution or likely distribution of returns by river (where rivers [listed north to south] are on one axis and probable proportion of 500 and probable proportion of historic values are on the other axis) would be informative. A depiction of past and present returns by sub-basin area, river length or habitat area would also be informative in enhancing the plight of steelheads and most likely, the evidence leading to the categorization of prioritized core rivers.

The plight of chinook salmon and steelhead in the Central Valley and their propensity for recovery were addressed in a background document by Lindley et al (2007). While the Central Valley is another ESU/DPS its proximity to the southern California DPS leads one to wonder if deductions with regard to recovery in the Central Valley are not perhaps relevant and even more optimistic than those for recovery in the southern California steelhead DPS. For the Central Valley, Lindley et al. (op cit citing Scott et al (2005)) suggest that one 'accept the notion that in spite of recovery efforts, listed salmonid ESUs are likely to be 'conservation reliant'. The statement by Scott et al (op cit) is broad ranging and without regard to the potential for differences in the persistence capacity of those salmonid ESUs in the Pacific Northwest and those such as the Central Valley which border on southern extremities of the species geographic range. Nevertheless, Lindley et al (op cit) are supportive of the view that it *may be possible to restore enough habitats* such that salmonid ESUs of the Central Valley could persist with appropriate management of ecological processes at the landscape level, i.e., avoid extinction. Could this be true for the DPS in question?

This reviewer is also influenced by the many contributors to "*Salmon 2100: The future of wild Pacific Salmon*" (Lackey et al. 2006a). Lackey et al. (op cit) cite several 'political realities' working against recovery, and I would venture to extend that to persistence of salmonids in the more densely populated BPGs of southern California. Simply stated they conclude that i) rules of commerce and economic growth work against salmon recovery; ii)

increasing scarcity of key natural resources, especially high water quality, will constrain ecological options; iii) the current trajectory for the region’s (Northwest Pacific although unlikely to be exclusive of southern California) human population precludes some frequently stated recovery goals; and iv) individual and collective life style preferences demonstrate that recovery is less important than many advocates assert (Lackey et al. 2006b). Given the likely increasing demand for a potentially diminishing water supply, this reviewer suggests that even the persistence of steelhead in all but possibly the least inhabited the small coastal drainages of southern California will be a challenge.

4.2.2 “*Threats*” are discussed at length in Chapters 3 and 4. It is noted that southern California steelhead declined in large part as a result of agriculture, mining, and urbanization activities that have resulted in the loss, degradation, simplification and fragmentation of habitat. Direct threats to steelhead as a consequence of environmental variability are discussed at length, (p 34-42) in the context of climate change. The product of climate change and human demands on water supplies essential to steelhead, i.e., the threats that might limit recovery to persistence are not discussed in the Draft Plan. While I have not investigated current forecasts of water demand in Southern California I note an article out of San Diego¹ in 2008 indicating that there was a 10% probability that the functional storage of the Colorado River’s Mead and Powell reservoirs will be gone by 2013 and a 50% probability that it will disappear by 2021.

4.2.3 *Recovery actions* to remove or reduce those threats such that recovery goals can be achieved are listed in the recovery action matrices of each of the 5 BPGs, Sections 8-12 (unpacked in Table 6-2 and Section 7). As mentioned previously (management actions and recovery actions as used in the Draft Document are synonymous), specific critical actions (Table 6-2) are described for obstructions to fish passage or alter natural stream discharge. The majority of actions however, e.g., ‘develop a plan and implement a program’, ‘conduct a watershed wide assessment’, ‘review permits etc. suggest that inventories are lacking and the specifics of what needs to/might be done for recovery are as yet unclear.

The appearance that specific recovery actions may be unclear could be incorrect given that for the Monte Arido Highlands BPG (for example), “varying number and intensities of habitat impairments were identified in the CAP Workbooks”, ref. p 81, ‘8.4 Threats and Threat Sources’. Should this information be available I would suggest the inclusion of a narrative describing each stream and sub-basin (addressed in the Recovery Action matrices, Sections 8-12) and its threats be appended, e.g., App A, “Threats Assessment for the Evolutionary Significant Units of...” of the Recovery Plan for the Evolutionary Significant Units of Sacramento River Winter-Run Chinook Salmon and central Valley Spring-Run Chinook salmon and the Distinct Population Segment of Central Valley Steelhead (Draft version Oct 2008).

The threat from hatchery stocking is lightly addressed on p 32 and largely dismissed, perhaps because the only disseminations are of freshwater life history forms to waters above barriers to steelhead. Their threats, e.g., disease transmission, are unknown; microsatellite data suggest that they do not successfully contribute to anadromous forms (i.e., those

¹ www.signonsandiego.com_news/metro/200820/3-9999-1n13mead.html

spawners that dropped below the barrier and either crossed over to anadromy or persisted below in freshwater did not breed with steelhead). I would add however, to the list of adverse impacts of the Fillmore facility:

- 1) continued distribution of the Fillmore strain above barriers to steelhead migration and amongst now non anadromous behaving ancestors can only increase the probability that genetics of potentially valuable refuge populations will be compromised;
- 2) hatchery production for the supplementation of recreational fisheries utilizes space and resources that the State might direct to the restoration of steelhead; and
- 3) public funded hatchery supplementation of fisheries opposes conservation principles of maintaining sustainable genetically diverse populations.

In summary, it is suggested that the document include a summary paragraph on the major threats, the enormity of the tasks to abate those threats, the uncertainties in avoiding extinction, and the possibility that the best case scenario may be that any sustainable populations will be ‘conservation reliant’.

4.3. Does the recovery strategy and overall recovery plan provide clear guidance for the public, restorationists, managers, regulators and others to act in a relevant manner over the next several decades to promulgate recovery of salmon(?) and steelhead.

The Draft Document does not as yet provide clear and specific guidance for the public and others to act on steelhead over the next several decades. Specific critical recovery actions are identified in Table 6-2 but lack details. As indicated elsewhere the recovery action descriptors in the matrices of sections 7 and 8-12 are largely general, for example ‘develop a plan and implement a program’, ‘conduct a watershed wide assessment’, ‘review permits etc. An unpacking of the descriptors is provided in the glossary (Table 7.1) but in many cases suggest workloads that unless broken into prioritized tasks with time lines within a basin/sub-basin (often at the level of a stream “reach”) could be overwhelming to a stakeholder. It would be expected that these tasks will extend ‘for decades’, certainly well beyond the 5 years for which costs are to estimated (ref columns in the BPG matrices). The specific tasks could well be defined in a subsequent Implementation Plan.

Another issue relevant to ‘clear guidance’ is the prioritization of the various actions described across sections 8-12. Section 7 indicates that that core 1 rivers with actions ranked ‘1A’ would supersede core 1 rivers ranked ‘1B’ and so, on but it is unclear how core 1A projects across BPGs would be prioritized in the event that separate interests were to compete for the same dollars to address equally prioritized recovery actions within the same or in different BPGs.

Editorial comments on the recovery action tables and the scheme for indicating the existing priority appear in Appendix C.

4.4. Review the research and monitoring recommendations made in the Report and make any additional recommendations, if warranted.

4.4.1 Research 'recommendations' (my paraphrasing) within Section 13.2 are:

- 1) determine the relationship between flow patterns, abundance and timing of smolt and adult runs through long term monitoring (13.2.2);
- 2) identify steelhead nursery habitats through tracking of growth and survival of tagged juveniles in various freshwater and estuarial habitats (13.2.3);
- 3) determine the extent to which seasonal lagoons are used as nursery areas for juvenile steelhead, and ecological factors that contribute to lagoon productivity and reliability by conducting comparative studies on environmental controls (13.2.4);
- 4) research the potential nursery role of mainstem habitat through either a) an empirical study of habitat by juveniles or b) water-temperature modeling that accounts for effects of climate, insolation, and groundwater interaction on mainstem temperatures esp. during summer (13.2.5);
- 5) test the importance of intermittent creeks in contributing to steelhead viability targets (no methodology proposed; 13.2.6);
- 6) determine saturation density of spawners in both mainstem and tributary spawning habitats by monitoring a number of core and non core populations of spawners in selected mainstem and tributary streams (13.2.7);
- 7) identify environmental factors that specifically promote anadromy (13.2.9a);
- 8) determine if there is any regularity in freshwater and anadromous life-history crossovers by estimating the frequency of occurrence (13.2.9b);
- 9) determine how life-history crossover affects the persistence of the anadromous form using individually based or integral projection population models (13.2.9c);
- 10) determine the frequency of inter-basin exchange and impact on population structure through (possibly) genetic tags and ecological traps in small coastal basins (13.2.10); and
- 11) identify watersheds that are resistant to the negative effects of drought on steelhead habitat (13.2.12.1).

This reviewer concurs that each of the eleven 'recommendations' have merit, although more insight to the proposed methods would have provided more upon which to comment. My comments are brief and as follows:

- 1) Good, essential for making progress towards recovery goals;
- 2) OK, but do question the apparent theme of seeking areas of fast and efficient growth, possibly at the expense of genetic diversity; insure that the data can be used to validate (e.g., relative productivity [densities] by gradient reach) the current estimates of habitat generated using remotely derived data. Knowledge of the potential production in the entire DPS should be informative to recovery goals.;
- 3) OK;
- 4) OK, consider both approaches, not either or;
- 5) Good and esp. relevant to a habitat quantification exercise
- 6) Good, if only just for the requirement to monitor; peripheral determinations should include the degree of redd superimposition and estimates of fry production resultant of varying spawning densities;

- 7) OK, particularly if ‘environmental’ focuses on those elements such as discharge and water temperature – information important to management of flows from impoundments;
- 8) OK, but not a priority;
- 9) OK;
- 10) OK; and
- 11) Good.

Additional Recommendations include:

Investigate the utility of establishing steelhead ‘living gene banks’ (O’Reilly and Doyle 2007) among ‘non anadromous’ populations in closed systems (screened outlets?) upriver of barriers to steelhead (ref. Alaskan findings of Thrower et al [2004a] *in* Boughton et al 2006) and as well, determine the potential of steelhead to increase genetic diversity of the non anadromous populations for use in future reclamation projects.

Relative to the year 2010, investigate through 2150, decadal scenarios of climate change affecting the abundance of surface and ground water, human demands for water and surpluses remaining for present day habitat of steelhead trout in the southern California DPS.

Assess abundances of steelhead life forms in terms of production per unit.

Upon review of Section 13 and the research recommendations it occurred to me that there should be a statement as to the priority of the research recommendations. My first concepts of priority originated in the chapter introduction (p 230) that the ‘chapter outlines the *research* program and is divided into 4 sections’ (research recommendations are really only found in the second section). The 4 sections are described (differently from the ToC) as providing:

- 1) a review of the viability criteria from Boughton et al (2007);
- 2) overview of relevant *research* questions subdivided into themes;
 - a. enhancing anadromy (recommendations 1-6 above);
 - b. clarifying uncertainties about population structure, (recommendation 7-10 above);
 - c. planning for climate change (recommendation 11 above);
- 3) framework for monitoring populations; and
- 4) framework for integrating monitoring and management.

In retrospect, I generally agree that the research recommendations (1-11) are reasonably prioritized. However, I was initially misled by the prospect that ‘enhancing anadromy’ was a greater priority than population structure.

As alluded to above, not all of the section 13 headers are *research* per se. Section 2 is the outline for research, and sections one and three are more like backgrounders to research. The title for Section 4 seems more descriptive of “Adaptive Management”.

ToR 4.4 also highlights a need for consistency between sub sections in the identification of the 'recommendation', i.e., the use of the bold face 'recommendation' tails off by sub section 13.2.10. Subsection 13.2.11 refers to implementation of 'recommendations' (p 247) in sections that do not appear in the Draft Report, and finally in subsection 13.2.12.1 (Planning for Climate Change) the reader is introduced to a 'research *need*' involved in identifying watersheds expected to be suitable for steelhead populations in the future. The difference between 'needs and recommendations may be moot?

4.4.2 Potential Monitoring Methods: Methods discussed in the Plan included:

- 1) Counting at fish ladders
- 2) Redd counts
- 3) Use of a DIDSON Acoustic camera (adults)
- 4) RFID tags (juveniles)
- 5) Young of the year otoliths

The discussion of methods 1 and 2 is appropriate; I have had no experience with items 3-5. Discussion of the draw backs of the following techniques (and presumably others) which by their absence must not have potential in southern California, could be considered for inclusion in Section 13.3:

Juvenile monitoring: Electrofishing was mentioned in passing but not as tool for establishing juvenile indices of abundance, either by removal or mark-and-recapture estimators. Given that electrofishers may require special permitting for use in the waters of endangered populations, there is as well the option of the making the same estimates via snorkel diving.

Smolt monitoring: Smolt wheels have proven valuable in a wide range of flow conditions. Outgoing populations can be estimated by mark-and-recapture methods involving the capture of as little as 5% of the population. Marked fish are those first captured and subsequently recycled upriver of the wheel.

Adult monitoring: 'Snorkel or float counts have also been successfully used to derive mark-and-recapture estimates of in-river Atlantic salmon. Adults are captured by seine, marked at several locations (large disk tags), released, given an appropriate number of days to redistribute and subsequently recorded with unmarked fish in a float-thru of the river by snorkellers.

5. Summary of Findings

ToR 3.1 In general, the Plan cites and includes some of the best scientific and commercial information available on the species and its habitats as well as the threats to the species and to its habitat. Large-scale perturbations such as climate change and ocean conditions are well discussed but excluded as a threat source. Exclusion of more detailed background material on species abundance, past and present abundance of habitat and details of threats was most troublesome.

ToR 3.2 For the most part, opposing scientific studies or theories are acknowledged and discussed. One contentious area which was not fully brought forward from the TRT and literature pertained to other perspectives of the size of viable/ self-sustaining populations.

ToR 3.3 The logical scientific conclusion resulting from the development of the Plan is a need for data to elucidate population structure and abundances, improve viability criteria, and better define habitat for the assessment of threats and production potential. These broad areas were addressed by a series of research recommendations.

ToR 4.1 The Plan does not yet meet the minimum standards for recovery [4(f)(1)(b) of ESA]:

- site-specific management actions with some exceptions are largely described at the basin and sub-basin level. Critical recovery actions are directed to named obstructions but others are less specific, e.g., all culverts within a basin or developing programs for a sub-basin;
- objective measurable criteria (criteria that links to listing factors) were developed and proposed but there appears to be no manner by which to obtain same; and
- estimates of time and cost are not provided.

ToR 4.2. The Draft Plan presents only a brief insight into imminent risk of extinction, generous insight into key threats and a considerable listing of general recovery actions;

- extinction risk is summarily conveyed by way of the estimated status of the population (<2% of historical levels ; other supportive information is not provided); considerable discussion on the possible effects of the numerous threats and climate change on the environment of the steelhead does not address the strong possibility of extinction per se; sources not considered in the Draft Plan suggest that populations may at best be conservation reliant.
- threats listed are generally all encompassing (exclusive of hatcheries) but without consideration of the potentially increasing interaction of climate change and human demands for the steelhead's water
- actions to reduce the threats are numerous, prioritized and summarized but not provided in any detail.

ToR 4.3 The Draft Document does not as yet provide clear guidance for the public and others to act in a relevant manner (over the next several decades) to promulgate recovery of steelhead as most actions are not well enough defined. While projects are prioritized within a basin they do not appear to be prioritized if of the same rank within and across basins.

ToR 4.4.1 Eleven research recommendations were presented, are justified and are arranged in an approximately prioritized sequence; recommendations to develop living gene banks, assess steelhead abundances in area as well as linear measure, and develop scenarios of water availability to existing steelhead habitat over the coming decades are proposed.

ToR 4.4.2 Six methodologies for monitoring steelhead were discussed; all have their merits. Mark and recapture estimates of juveniles, smolts and adults employing electrofishing, smolt

wheels and snorkel diving respectively, were not included and merit mention and rationale for their exclusion.

6. Conclusions and Recommendations

The Draft Report is well researched, written, free of major editorial glitches but to its disadvantage, deviates in the organization of the 'Background' from that recommended by NMFS (2007a). More significantly it excludes available and important background materials useful to both the casual reader and those who will be promulgating the Plan. The materials deemed necessary for inclusion are:

- a broader understanding of past and current abundances of steelhead in the DPS, i.e., likely to have been largely presented during the 'listing' process;
- the critical habitat identified with respect to 'listing' and summary model outputs used to construct maps of predicted habitat in each DPS; and
- the extent and location of site specific threats apparently identified in the CAP Workbooks and essential for the Implementation Plan.

I suggest two approaches: 1) append an organized form of the more detailed information to the Plan, and 2) include meaningful encapsulations in the Plan. The important recovery time frame and cost estimates are presumed to be under development.

Exclusions of a smaller scale which merit consideration/discussion in the Report include:

- a more insightful discussion of alternative criteria for viable populations;
- text or graphics that better illustrate the 'imminent' risk of extinction;
- scenarios of the more likely impact of climate change on steelhead in the DPS in question, including the potentially accompanying human adjustments to same;
- the prioritization of equally rated recovery actions within and across basins;
- the potential in each BPGs over the next several decades for man's need for water to further impact that available to steelhead;
- potential resources, particularly public resources, needed to attain near term (prevent extinction and lead to persistence), and long term (actions to down list/ de-list) objectives within each of the core watersheds;
- a more serious consideration of the use of living and live gene banks; and
- the determination of 'area' additional to 'linear' measures, and other parameters to describe habitat and fish abundances, e.g. fish per gradient or temperature-classified area.

Research recommendations additional to those proposed are:

Investigate the utility of establishing steelhead 'living gene banks' (O'Reilly and Doyle 2007) among 'non anadromous' populations in closed systems (screened outlets?) upriver of barriers to steelhead (ref. Alaskan findings of Thrower et al [2004a] *in* Boughton et al 2006) and as well, determine the potential of steelhead to increase genetic diversity of the non anadromous populations for use in future reclamation projects.

Relative to the year 2010, investigate through 2150, decadal scenarios of climate change affecting the abundance of surface and ground water, human demands for water and

surpluses remaining for present day habitat of steelhead trout in the southern California DPS.

Assess abundances of steelhead life forms in terms of production per unit.

7. Appendices

- A. Bibliography of Materials Reviewed
- B. Statement of Work for Dr. Larry Marshall
- C. Editorial Comments

Appendix A: Bibliography of Materials Reviewed

- Boughton, D.A., H. Fish, K. Pipal, J. Goin, F. Watson, Julie Casagrande, Joel Casagrande, and M. Stoecker. 2005. Contraction of the southern range limit for anadromous *Oncorhynchus mykiss*. NOAA-Natl. Marine Fisheries Service, SW Fisheries Sci. Ctr. Tech. Memo No 380, Santa Cruz, CA. 21p.
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Appendix B: Statement of Work for Dr. Larry Marshall

External Independent Peer Review by the Center for Independent Experts Southern California Steelhead Draft Recovery Plan

Scope of Work and CIE Process: The National Marine Fisheries Service’s (NMFS) Office of Science and Technology coordinates and manages a contract to provide external expertise through the Center for Independent Experts (CIE) to conduct impartial and independent peer reviews of NMFS scientific projects and to participate in resource assessments involving NMFS. The Statement of Work (SoW) described herein was established by the NMFS Contracting Officer’s Technical Representative (COTR) and CIE based on the resource assessment requirements submitted by NMFS Project Contact. CIE appointees are selected by the CIE Coordination Team and Steering Committee to conduct the peer review of NMFS science and to participate in resources assessments with project specific Terms of Reference (ToRs). The CIE appointee shall produce a CIE independent report of the appointee’s involvement with specific format and content requirements (**Annex 1**). This SoW describes the CIE appointee’s work tasks and deliverables related to the following NMFS resource assessment project.

Further information on the CIE peer review process can be obtained at the CIE website via:
<http://www.iexperts.gogax.com/index.html>.

Project Background: The Endangered Species Act (ESA) requires NOAA’s National Marine Fisheries Service (NMFS) to develop and implement recovery plans for the conservation of threatened and endangered species. The endangered Southern California Distinct Population Segment (DPS) of steelhead occur in an area extending from the Santa Maria River south to the Tijuana River at the US-Mexico border. The geographic area of this DPS contains a series of large river basins that extend inland considerable distances and short coastal systems within urbanized areas that are densely populated. The draft recovery plan serves as a guideline for achieving recovery goals by describing the watersheds and recovery actions that must be taken to improve the status of the species and their habitats. Although the recovery plan itself is not a regulatory document, its primary purpose is to provide a conservation “road map” for Federal and state agencies, local governments, non-governmental entities, private businesses, and stakeholders.

The NMFS Recovery Plan for the southern California steelhead is expected to generate substantial interest from outside parties because it: (1) will contain recommendations involving water supplies for a variety of municipalities and agricultural users in an area of low annual rainfall; (2) will prioritize watersheds for targeted restoration actions; (3) could influence local and regional planning efforts and decisions involving land-development patterns; and (4) advise state agencies and local governments on actions necessary to further improve land-use and water-management practices to protect the listed species and its freshwater habitats. The draft recovery plan will include a large geographic area in southern California and has the potential for wide-ranging implications in the public and private sectors. Stakeholder interest will be high due to the potential impact to millions of southern Californians and is expected to lead to inquiries from elected representatives at the local, state and Federal levels.

Requirements for CIE Reviewers: CIE shall provide three CIE reviewers to conduct a desk peer review (i.e., without travel requirement) of NMFS Draft Southern California Coast Steelhead Recovery Plan to ensure that its contents can be factually supported and that the methodology and conclusions are scientifically valid. The area under consideration will be the lands and waterways in southern California. The desk review shall be conducted in accordance with the ToRs, SoW tasks, and schedule of milestones and deliverables as described herein. The location of the peer review does not need to occur on site. Draft documents can be mailed to reviewers.

Each reviewer’s duties shall not exceed a maximum of ten work days. Each reviewer shall analyze the relevant Technical Memoranda developed by NMFS Technical Review Team (TRT) for the South-Central/Southern California Coast Steelhead Recovery Planning Domain as well as the draft Southern California Coast Steelhead Recovery Plan and develop a detailed report in response to the ToR (to be appended as Annex 1). The

reviewers shall conduct their analyses and writing duties from their primary locations. Each written report is to be based on the individual reviewer’s findings. See Annex II for details on the report outline.

NMFS requests the review be conducted by reviewers with strong credentials in west coast steelhead management activities under the Endangered Species Act.

CIE reviewers shall have expertise in steelhead management, conservation biology, steelhead restoration practices, steelhead/water management, and steelhead conservation under the ESA. Additionally, because of the many unique physical/hydrological aspects of habitat at the southern extent of the species range and the special adaptations of the species to this habitat, it is important that peer reviewers have familiarity with southern California steelhead biology and conservation issues.

The CIE reviewers shall have the requested expertise necessary to complete an impartial peer review and produce the deliverables in accordance with the SoW and ToR as stated herein (refer to the ToR in Annex 1).

Statement of Tasks for CIE Reviewers: The CIE reviewers shall be required to complete the following four tasks: Task 1 - conduct necessary preparations prior to the peer review; Task 2 - conduct the peer review; Task 3 – prepare independent CIE peer review draft reports in accordance with the ToR and milestone dates as specified in the Schedule section; and, Task 4 – Revise draft reports to produce final reports in accordance with the ToR and milestone dates as specified in the Schedule section. Each task is described more fully below.

Task 1 - Necessary Preparation Prior to the Peer Review: The CIE shall provide the CIE reviewers contact information (name, affiliation, address, email, and phone) to the Office of Science and Technology COTR no later than the date as specified in the SoW, and this information will be forwarded to the Project Contact.

Approximately two weeks before the peer review, the Project Contact will send the CIE reviewers the necessary documents for the peer review, including supplementary documents for background information. The CIE reviewers shall read the background documents for the actual peer review.

This list of background documents may be updated up to two weeks before the peer review. Any delays in submission of background documents for the CIE peer review will result in delays with the CIE peer review process. Furthermore, the CIE reviewers are responsible for only the background documents that are delivered to them in accordance to the SoW scheduled deadlines specified herein.

Task 2 - Conduct the Peer Review: The reviewers shall conduct their analyses and writing duties from their primary locations as a “desk” review. Each written report is to be based on the individual reviewer’s findings and no consensus report shall be accepted.

The primary role of the CIE reviewer is to conduct an impartial peer review in accordance to the Terms of Reference (ToR) herein, to ensure the best available science is utilized for the National Marine Fisheries Service (NMFS) management decisions (refer to the ToR in Annex 1).

The ToR for the CIE peer review is attached to the SoW as Annex 1. Up to two weeks before the peer review, the ToR may be updated with minor modifications as long as the role and ability of the CIE reviewers to complete the SoW deliverable in accordance with the ToR are not adversely impacted. Please see Annex 1 attached.

Task 3 - Prepare Independent CIE Peer Review Draft Reports: The primary deliverable of the SoW is each CIE reviewer shall complete and submit an independent CIE peer review report in accordance with the ToR, and this report shall be formatted as specified in the attached Annex 2.

Task 4 - Revise Draft Reports to Produce Final Reports: Following a review of their reports by the CIE technical team, reviewers will revise their draft reports, and produce written final reports. Reviewers will submit their final reports to the CIE.

Schedule of Milestones and Deliverables: The CIE review and milestones shall be conducted in accordance with the dates below.

21 May 2009	CIE shall provide the COTR with the CIE reviewer contact information, which will then be sent to the Project Contact
28 May 2009	Project Contact will send CIE Reviewers the background documents
28 May – 11 June 2009	Each reviewer shall conduct an independent peer review
25 June 2009	CIE shall submit draft CIE peer review reports to the COTRs
6 July 2009	The COTRs will distribute the final CIE reports to the Project Contact

Acceptance of Deliverables: Each CIE reviewer shall complete and submit an independent CIE peer review report in accordance with the ToR, which shall be formatted as specified in Annex 2. The report shall be sent to Manoj Shivlani, CIE lead coordinator, via shivlanim@bellsouth.net and to Dr. David Die, CIE regional coordinator, via ddie@rsmas.miami. Upon review and acceptance of the CIE reports by the CIE, the CIE shall send via e-mail the CIE reports to the COTR (William Michaels William.Michaels@noaa.gov) at the NMFS Office of Science and Technology by the date in the Schedule of Milestones and Deliverables. The COTRs will review the CIE reports to ensure compliance with the SoW and ToR herein, and have the responsibility of approval and acceptance of the deliverables. Upon notification of acceptance, CIE shall send via e-mail the final CIE report in *.PDF format to the COTRs. The COTRs at the Office of Science and Technology have the responsibility for the distribution of the final CIE reports to the Project Contacts.

Request for Changes: Requests for changes shall be submitted to the Contracting Officer at least 15 working days prior to making any permanent substitutions. The Contracting Officer will notify the Contractor within 10 working days after receipt of all required information of the decision on substitutions. The contract will be modified to reflect any approved changes. The Terms of Reference (ToR) and list of pre-review documents herein may be updated without contract modification as long as the role and ability of the CIE reviewers to complete the SoW deliverable in accordance with the ToR are not adversely impacted.

Key Personnel:

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ANNEX 1

Terms of Reference

CIE Peer Review of California’s Southern California Coast Steelhead Draft Recovery Plan

The scope of work should focus on the principal elements required in a recovery plan. These principal elements have been defined in section 4(f)(1) of the federal Endangered Species Act (ESA) and sections 1.1 and 1.2 of the National Marine Fisheries Service Interim Recovery Planning Guidance (NMFS 2006)

Section 4(f)(1)(b) of ESA states that “each plan must include, to the maximum extent practicable,

- a description of such site-specific management actions as may be necessary to achieve the plan’s goal for the conservation and survival of the species;
- objective, measurable criteria which, when met, would result in a determination...that the species be removed from the list; and,
- estimates of the time required and the cost to carry out those measures needed to achieve the plan’s goal and to achieve intermediate steps toward that goal.”

From section 1.1 of NMFS (2006), a recovery plan should:

- “Delineate those aspects of the species’ biology, life history, and threats that are pertinent to its endangerment and recovery;
- Outline and justify a strategy to achieve recovery;
- Identify the actions necessary to achieve recovery of the species; and
- Identify goals and criteria by which to measure the species’ achievement of recovery.”

Background Materials Required

There are five NMFS Science Center Technical Memoranda that form the biological framework for the recovery plan. These memoranda and other supporting information are critical to the review of the Draft NCCC Recovery Plan and include:

- Technical Recovery Team Reports:
- Historical Structure
- Viability Criteria
- [Contraction of the southern range limit for anadromous *Oncorhynchus mykiss*](#)
- [Recent efforts to monitor anadromous *Oncorhynchus* species in the California coastal region: a compilation of metadata](#)
- [Potential steelhead over-summering habitat in the South-Central/Southern California Coast Recovery Domain: maps based on the envelope method](#)

In addition, other important references include

- 2006 (2007 Updates) NMFS Interim Recovery Planning Guidance
- Endangered Species Act (<http://www.nmfs.noaa.gov/pr/pdfs/laws/esa.pdf>)
- Derek Girman and J. C. Garza. (2006) Population structure and ancestry of *O. mykiss* populations in South-Central California based on genetic analysis of microsatellite data. 33pp.
- Garza, J. C., and A. C. Clemento. (2008) Population genetic structure of *Oncorhynchus mykiss* in the Santa Ynez River, California. 55pp.

CIE Peer Reviewer Questions:

Evaluate the adequacy, appropriateness and application of data used in the Plan.

1. In general, does the Plan include and cite the best scientific and commercial information available on the species and its habitats, including threats to the species and to its habitat including large-scale perturbations such as climate change and ocean conditions?
2. Where available, are opposing scientific studies or theories acknowledged and discussed?
3. Are the scientific conclusions sound and derived logically from the results?

Evaluate the recommendations made in the Plan.

1. Does the Plan meet the minimum standards for recovery plans outlined in the NMFS Interim Recovery Guidance and mandates described in section 4(f)(1)(b) of ESA to include site-specific management actions, objective measurable criteria (criteria that links to listing factors) and estimates of time and cost?
2. Is there a clear presentation of the species’ extinction risk, the threats facing the species and the necessary actions to remove or reduce those threats such that recovery goals can be achieved?
3. Does the recovery strategy and overall recovery plan provide clear guidance for the public, restorationists, managers, regulators and others to act in a relevant manner over the next several decades to promulgate recovery of salmon and steelhead.
4. Review the research and monitoring recommendations made in the Report and make any additional recommendations, if warranted.

ANNEX 2

Format and Contents of CIE Independent Reports

The report should follow the outline given below. It should be prefaced with an Executive Summary that is a concise synopsis of goals for the peer review, findings, conclusions, and recommendations. The main body of the report should provide an introduction that includes a background on the purpose of the review, the terms of reference and a description of the activities the reviewer took while conducting the review. Next, the report should include a summary of findings made in the peer review followed by a section of conclusions and recommendations based on the terms of reference. Lastly the report should include appendices of information used in the review (see outline for more details).

1. Executive Summary
 - a. Impetus and goals for the review
 - b. Main conclusions and recommendations
 - c. Interpretation of the findings with respect to conclusions and management advice
2. Introduction
 - a. Background
 - b. Terms of Reference
 - c. Description of activities in the review
3. Review of Information used in the Recovery Plan (as outlined in the table of contents in the Recovery Plan)
4. Review of the Findings made in the Recovery Plan
 - a. DPS considerations: Populations, Habitats and Threats
 - b. Extinction Risk Analysis and Recovery Criteria
 - c. Evaluation of Conservation Measures
 - d. Research and Monitoring Recommendations
5. Summary of findings made by the CIE peer reviewer
6. Conclusions and Recommendations (based on the Terms of Reference in Annex I)
7. Appendices
 - a. Bibliography of all material provided
 - b. Statement of Work
 - c. Other

Appendix C: Editorial Comments

In general, the report is well written. I did not check all of the text literature references against the citations listed in the Literature Cited. Many (most?) of the missing literature citations appear not to have been carried forward from supporting documents. Minor issues are as follows:

TOC -"Literature Cited" missing

List of Tables- minor inconsistencies in the use of Caps and lower case

p 5 line 7 & 9- "Chapters 8 through 12"?

p 14 Table- not evident in text as to why 'Gavioto' not included in Table

p 17 Figure 2-5- some uncertainty with respect to color shades in Legend matching overlay in map....possibly clarify by superimposing BPG text on map

p 23 line 37- 'is' still is or was??

p 29 last para- '45 major watersheds' here, but 46 in line 8 p 272?; Table D-1 p 273 suggests as many as 50?; suggest reference to Boughton and a little more insight to the results from CAP Workbooks (reference and in other places where referred to) would be in order here; reference for CAP Workbooks?

p 30 asterisk on "Threat Source"??

p 35 line 2- "Barry, et al. 1998; Bradley, and Jones 1995" missing from Lit Cit

p 35 line 5- 4 months = 'brief'?

p 35 lines 35-36 "Bedsworth and Hank 2008; Hanak and Moreno 2008" + next three missing from Lit Cit

p 35 last para- suggest bullets for the 9 effects

p 36 line 6- "Bakke 2008" missing from Lit Cit

p 36 line 41 "Tague 2008"?? there are two "Tague et al. 2008"s in the Lit Cit

p 37 lines 25, 29 and 45 "Miller and Schlegel (2006)", Keeley et al. 1999, and Overpeck et al. 2006" all missing from Lit Cit

p 40 line 15- known

p 41 line 40- delete 'the'?

p 44 line 22- possible to insert reference to p3 as well?

p 45 line 7, "five" should be six?

p 46 Table 5.1- suggest that caption could offer more explanation, minimally that narratives are offered in Section 5.3.1.1., and possibly for D.1.1, a footnote providing an overview of the determination of viable populations in Boughton et al. 2007.

p 47 '5.3.1.1'- re-title 'Recovery Criteria (Values) for Populations'?

p 47 line 8- 'Criterion 1.1' necessary to the caption? (same for headers in subsequent pages)

p 47 para line 8-21- should reference appropriate Boughton et al. and in line 21, possibly example from Ward and Slaney (1988)

p 47 line 37- references all missing from Lit Cit

p 48 line 22- reference missing from Lit Cit

p 49 line 16- 'Bradford et al. 2000' not in Lit Cit

p 49 line 35- 'Nanski and Gilpin 1997' not in Lit Cit

p 50 line 7- re-title 'Recovery Criteria (Values) for the DPS'? If suggestion is taken the alph- numerics in Table 5-1 could be removed

- p 51 lines 15-17- see notes later re: 'clutter' created by 'A's and 'B's in 'Recovery Action Matrices'; also perhaps appropriates to at least reference again the page on which the listing factors can be found
- p 54 line 29- 'Table 4-4' ??
- p 54 line 38- "Table", also suggest reference to Boughton et al, and brief description of how the Core populations were derived/decided
- p 58 lines 13-14 "Graf et al" equals Graf [ed]??; Hayes, et al. 2008 is missing from Lit Cit
- p 58 line 18- use bullets to highlight the two threats?
- p 61 Table 6-2, second cell on the right, superscript the '1'
- p 63 line 8- 'barriers' omitted between 'passage' and 'to'??
- P 67 lines 3-8- worth cross referencing the threats listed in Table 7.1 with those listed earlier in the text (p 30) and noting the reason for additions??
- p 68 Table 7.1- worth noting in the Table caption that the threat sources are listed in alphabetical order??
- p 82 Table 8-2 and the other color coded 'threat source ranking' tables, include core population ranking with the names of the watersheds in row 2?; also footnote NO color as in Table 11-2, p173
- p 84 - Table 8-4 and all other Recovery Action Matrix tables, suggestions as follows:
table captions to identify "Core" number of the populations within the watershed
- 'Table x-y, and basin name (?) continued' at the top of each page
table caption or footnote to explain 'Action Rank Column' developed back on p 51
- simplify Action Rank designations to 1, 2, and 3, indicating (suggestion) that one or all of ESA's listing factors 2-5 are satisfied and that the superscript designation e.g., ^a (there are only about 36 in all of the tab;es) affixed to the numeric indicates that it address ESA's first listing factor. In this fashion the current 'A's should better stand out on the page
- footnote (or en-caption) the relevance of the 4-color coding (4th is black) of table cells
- p 122 line 2 and p 124, line 3, be consistent in the use of '10' or 'ten'
- p 237 lines 16 and 17 'Logerwell et al., 2003' and 'Ward 2000' not in Lit Cit
- p 238 line 11- not sure about a 'similar slope'
- p 245 line 31- delete 'the' on right margin
- p247 lines 2, 8, and 13- references to 'sections' require a 13 prefix
- p 249 line 1- delete first 'southern'
- p 250 line 38- 'complete~~s~~'
- p 250 line 39- delete 'and south-central' (only because it is not entirely relevant here)
- p 251 line 30- insert 'by' between 'affected' and 'global'
- p 256 line 13- delete the word 'a'
- p 258 line 32- definition and use of 'disproportionately' seems awkward. 'Freshwater habitat that produces more anadromous than freshwater-resident recruits?? (opposite for line 35
- p 268 line 21- 'm/sec', is normally meters per second
- p 272 (again) line 8- '22 coastal watersheds' How does this relate to the 32 watersheds in column 2 of Table D-1 (p273)?
- p 273 Table D-1- "Good/Very good" drainages?
- p 276 line 6- "Hunt & Associates" not referenced
- p 269 Appendix B- bonus information in the table might be the inclusion of coding or reference to Appendix C re: the Biogeographic Group of each river and the coding or shading of the 11 Core 1 rivers

p 280 'Literature Cited' - unaware of the convention that allows for the use of 'et al' when authors are numerous.

With respect to the *framework* of this report (Table of Contents headings, subheadings and their nesting) relative to that suggested on p 5.1-5 of NMFS (2007a), I offer the following comments. I do so because the format suggested by NMFS (op cit) does allow for an easier and more logical flow through the 'Background' material and because some degree of standardization for all Recovery Plans enhances the ability of a reader of more than one plan to assimilate the issues more quickly. The suggested NMFS TOC for the body of the report is as follows:

- I. BACKGROUND
 - A. Brief Overview
 - B. Description and taxonomy
 - C. Distribution and Habitat Use
 - D. Critical Habitat
 - E. Life history
 - F. Abundance and Trends
 - G. Threats
 - H. Conservation Measures
- II RECOVERY STRATEGY
- III RECOVERY GOALS AND CRITERIA
 - A. Reclassification to Threatened
 - B. Delisting
- IV RECOVERY PROGRAM
 - A. Recovery Action Outline
 - B. Recovery Action Narrative
- V IMPLEMENTATION SCHEDULE
- VI LITERATURE CITED

Under the above scenario, 1.Introduction, 2.Steelhead Biology and Ecology, 3.Factors Leading to Federal Listing, and 4.Current DPS-Level Threats Assessment listed on p 'v' of the Draft Recovery Plan would be integrated into 'BACKGROUND' (the term 'Introduction' is no longer in vogue). It is worth noting that many of the sub headers on p 'v' are out of sequence when matched to the NMFS (2007a) outline.

Thereafter I have a tendency to agree with the authors of the Draft Recovery Plan that 'RECOVERY GOALS AND CRITERIA' should precede the 'RECOVERY STRATEGY'. However I'm not sure that the elevation of 'Summary of DPS-Wide Recovery Actions (p vi), the five BPG sections and the proposed 'Adaptive Management' section (p vi - vii) warrant more than sub-headers within the RECOVERY PROGRAM. I would suspect that the NMFS (2007a) 'IMPLEMENTATION' header would suffice and that 'Implementation by NMFS' (p vii) and other parties ala 'responsible parties' in the matrix tables for each BPG would rate as sub headers. As is the case of most scientific documents and NMFS (op cit) the convention for placement of LITERATURE CITED precedes the Appendices.